

ON DRAINAGE IN THE TREATMENT OF CERTAIN
INJURIES AND DISEASES INVOLVING THE
FLOOR OF THE CRANIUM.

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CASE I.¹—George Chism, æt. 21, white, baggage agent and night workman on the P. R. R., fell on his way home, before daylight, from the elevated road, a distance of thirty feet. Was found by the police patrol and brought to the Presbyterian Hospital about six o'clock, Dec. 6, 1888. He was admitted in an unconscious condition, in a state of collapse. The shock was due partly to the fall and partly to hæmorrhage. Temperature 97°, pulse 50, respiration 12.

Hypodermatic injections of whisky, digitalis and atropia were immediately administered, and whisky and beef tea by the mouth as soon as deglutition was possible. Hot bottles and warm blankets were employed externally. I saw the case at the request of Dr. Reed about five hours after the injury. The patient was still unconscious, but gradually reacting.

The point of greatest external injury was situated about an inch over the right eye. The wound was jagged, bruised, torn and cut, and exhibited beneath it a depressed fracture of the skull, from which brain substance exuded. The area of depression was at least an inch square, and was comminuted. On removal of the fragments of the external table, larger fragments of the internal table of a much greater circumference, and driven down upon and into the brain, were removed. The trephine was not used, but Hopkins' rongeur came most happily in play in removing angular points and enlarging the opening. Having cleared away the fragments, a fissure was noticed in the front part of

¹From notes by Dr. T. H. Hartswick, surgical interne Presbyterian Hospital.

the opening. This fissure was nearly a quarter of an inch wide at the point of injury and extended into the horizontal plate of the frontal bone. With the fore finger of my left hand I followed the course of the fissure, and traced it to the cribriform plate. In passing my finger along this tract, I did not dissect away the dura mater. It (the finger) followed along the course as if the soft structure had been torn away, either by the splitting of the skull, or the momentum of the injury.

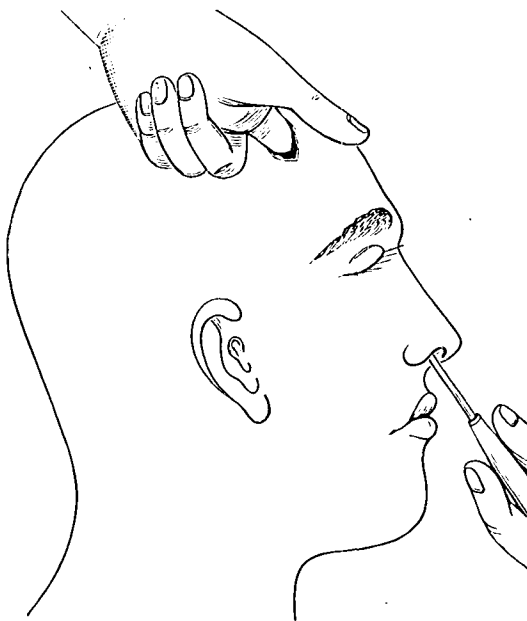


FIG. 1.—PERFORATING THE ETHMOID BONE FOR DRAINAGE.

Feeling satisfied that so extensive an injury would require drainage, and feeling that there was but one available outlet, I took a narrow chisel, and passing it through the right nostril, drilled through the cribriform plate, using my left fore finger within the skull as a guide. (See Fig. 1). I then passed a long probe into the nostril through the opening thus made, and bringing it out at the upper opening, attached a strong lig-

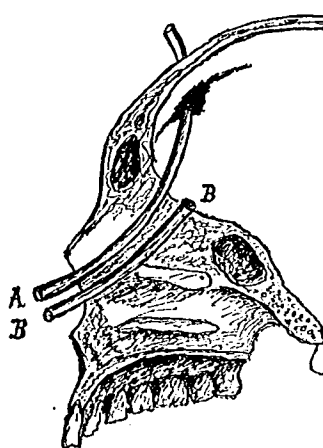


FIG. 2.—SECTION SHOWING THE COURSE OF THE DRAINS.

A. Second tube introduced.

B. First tube introduced.

would carry these particles into the upper nares where they would do no harm. A second drainage tube, $\frac{1}{4}$ in diameter, was then introduced which traversed the entire tract, and whose ends were secured by a connecting ligature. (See Figs. 2 and 3).

The tract was then washed out with tepid distilled water that had been previously boiled. No mercuric solution was used at any time, inasmuch as all the fluid injected passed from the upper nares into the pharynx and then involuntarily into the stomach. The wound was then

ature. To this I secured a piece of drainage tube $\frac{3}{8}$ inch in diameter and drew it, guided by my finger, until its upper end rested on a level with the cribriform plate. As the drainage tube was being drawn through, my left fore finger was within the skull, elevating the brain and compelling the tube to pass between my finger and the bone. My reason for drawing the tube from above downward was that I was conscious of comminuting, to some extent, the cribriform plate with the chisel I used in perforating it, and by drawing the tube downward I knew that I

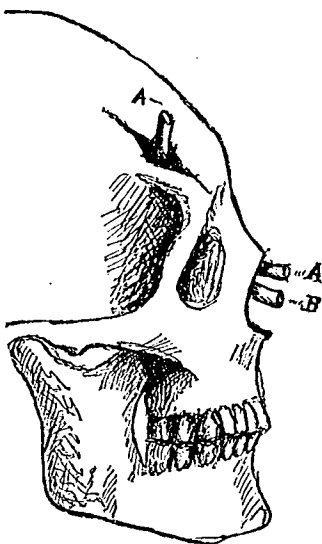


FIG. 3.—THE POINTS OF PROTRUSION OF THE DRAINS.

A and B. The drainage tubes.

gently approximated, dusted with iodoform and covered with protective and mercuric gauze. Patient's hands tied to prevent interference with the dressings, and hyd. ch. m. $\frac{1}{4}$ every two hours ordered. Later in the day the patient could be roused to give an intelligent monosyllabic answer, and toward evening, as he was becoming restless, potass. br. $\mathfrak{zss}$ and morphia sulph. gr. $\frac{1}{4}$ was administered. Evening temperature, 100.4° .

Dec. 9. Patient is gradually regaining consciousness. Answers questions with but little hesitancy if thoroughly aroused, but seems generally dull, and at times relapses into an incoherent mumbling. Dressings removed down to protective, tract syringed out with tepid water, and directions given to dress daily and wash as above.

Dec. 10. Entire wound dusted; wound has a healthy appearance; no brain substance observed in the bottom of the wound. Morning temperature 100.4° ; evening, 101.4° .

Dec. 11. Mental condition so far improved that his restraints were withdrawn, and the relay of watchers suspended. As the result of this, the patient picked the larger drainage tube from his nose, giving as a reason that its presence gave him great pain.

Dec. 13. Temperature normal, doing well.

Dec. 18. The second drainage tube was withdrawn, and two strands of silk ligature substituted to keep the tract patulous a little longer.

Dec. 19. Patient getting hungry, and a more liberal diet prescribed. Sleeps well. Has constant pain in the head, though not of a severe type.

Dec. 30. Wound is granulating and nearly closed. Hearing lost in left ear; impaired vision in corresponding eye.

Jan. 5. Silk ligature removed; dressings scarcely soiled by discharge.

Feb. 2. External wound closed.

REMARKS. There was no other noticeable injury than that to the skull. Upon this exploded the entire vulnerating force. There was no other fracture throughout the body, no spraining or dislocation, no hæmorrhage from the lungs, kidneys or rectum, and the greatest possible surprise meets us at the outset, viz., that the man was not instantly killed.

The perforation of the ethmoid plate and drainage of the injured brain from the most dependent point seemed at the time to be indicated, and does not seem to have given rise to irritation. There was at no time a high temperature. On the fifth day it reached 101.4° F.,

but fell to normal by the seventh day, and remained normal until complete recovery.

SPECULATIONS.

Thus far I have recorded facts, or at least have endeavored to. The case, as will be readily imagined, made a deep impression upon my mind, and has given rise to many and far reaching speculations. Some reader may ask "How did it occur to you to drill the ethmoid for drainage?" My answer is, that with my forefinger within the skull, and resting upon the ethmoid plate, the drainage from the base of the brain at this point was the most natural procedure conceivable. I felt that at the worst it could only destroy a certain number of the olfactory filaments, and these I considered already lacerated from the case with which I introduced my finger. I felt too that so extensive a brain lesion could only undergo repair by sloughing off dead elements, while the hæmorrhage, serum and dissolving brain tissue, noticeable at the upper opening, could only be rendered innocuous by rapid removal.

And now the question arises, may not the fortunate issue of this case be turned to a good account in certain other well known, but heretofore fatal lesions?

In Chism's case the trephining over the left eye and elevation of the bone was all I proposed to myself when I undertook his case. The introduction of the forefinger and exploration of the base of the brain from this quarter was an afterthought; what I now propose as a legitimate procedure is, exploratory trephining in cases like the following:

"A little girl, æt. 6 years, falling with a piece of slate pencil in her hand, it pierced her right eye-brow near the inner end and broke off. Admitted soon after into the Middlesex Hospital at 6 p. m., in May, 1870, the house surgeon took out of the wound several splinters, composing as he thought the whole piece, covered the wound with a pad of lint and had the child placed in bed. Her general condition did not betray the serious nature of the injury. She slept quietly through the night, and next morning did not appear much worse for the accident. In the afternoon when I then first saw the child I detected with a probe another splinter of the pencil, and enlarging the little puncture,

exposed the piece of pencil tightly plugging a hole in the bone. Enough of this was cut away cautiously with a gouge to allow the pencil to be grasped with a forceps. It proved to be shattered, and splinters representing a cylinder three quarters of an inch long were removed. Intra-cranial inflammation (indicated by convulsions, delirium, a high temperature (103° F.) and rapid pulse) supervened. On the ninth day after the injury the temperature fell to 97.5° F. (the child had passed a quiet night and took her food better) and from that date it continued sub-normal or only slightly exceeded the normal average until the sixteenth day when it rose suddenly to 104° F. With this elevation of temperature there was associated restlessness, delirium, a flushed face, screaming, vomiting, convulsions and coma. Death occurred about twenty-four hours later. At the necropsy a large abscess was found in the frontal lobe of the right cerebral hemisphere. It enclosed a piece of pencil about one inch long, and it had evidently quite recently burst into the anterior bone of the lateral ventricle. It is a matter of regret that the trephine was not employed instead of cutting away the bone around the pencil which had the effect of loosening the splinters, and contributed to the fatal mistake that the whole piece of pencil had been removed.¹—I. W. H.

The history of this case and its fatality has its counterpart in the experience of surgeons in every age. Nature does her best, affords every possible assistance to the surgeon, but is helpless against such fearful odds to avert a fatal issue; art dresses the wound with a dossil of lint, watches the case with sagacious indifference, and confirms its diagnosis with an autopsy. No class of injuries are more inevitably fatal than penetrating wounds through the nares or orbit. Internal medication is of no earthly value, and nothing but rational surgical treatment is likely ever to save such a case. Modern surgery has removed all danger and indecision from compound fractures of the extremities and penetrating wounds of the articulations. Why fear to adapt the same principles to analogous injuries and analogous tissues in others parts of the body. In a similar case to the one cited, and judging from the experience derived from Chism's case, the most natural step to take would be to trephine above the orbit and then pass the finger to the

¹Holmes and Hulke, *System of Surgery*, Vol. 1, p. 586.

point of injury, and *learn from the finger* the state of affairs at the point of greatest danger; with the finger within the skull and touching the pencil, we have a guide to its extraction through the orbit, or, if it be necessary to enlarge the opening in the base of the skull, the finger within the skull and between the brain and the bone would add to the safety and precision of the chisel. Then too, it is only with a finger within the cranium that a drainage tube can possibly be adjusted. In Chism's case the large drainage tube was drawn from the upper opening along the course of my finger, which protected the brain from further injury in the passage of the tube, until its upper open extremity rested on a level with the cribriform plate. Such a procedure would have been impossible without the finger within the cranium. But there is a further interest in the case cited. It was evident to all concerned that there was a localized cerebral abscess induced by the injury. To reach and empty such an abscess would be a very simple matter if attempted in the way already described; with a finger within the skull the exact point of *skull-fracture* could be located. With the *point of external injury known*, we have the unerring path of the original vulnerating body, and a probe passed along it would evacuate the abscess.

Another class of cases to which such a surgical procedure seems eminently applicable is that very common, intractable and dangerous malady known as chronic middle ear disease. The fatal tendency of this disease has been handed down from generation to generation. Two modes of death equally appalling and inevitable, the one from septic absorption the other from meningitis and cerebral abscess, cut short the lives of many victims, otherwise healthy. To attempt to remove the disease by drilling the mastoid, has proved unsatisfactory. The entire disease cannot be removed. Now I have nothing to suggest that will throw light upon the treatment of this affection in its milder stages. But when symptoms of meningeal inflammation show the steady advance of the carious process, is there nothing that can be done to avert the early and inevitable tendency of the disease? In such a case I cannot imagine a more rational and effective mode of procedure than that I employed in the case of Chism. Let a point be selected that will readily command the middle cerebral fossa, say

point an inch behind and an inch and a half above the external auditory meatus. In the use of the trephine the chief difficulty will be to reach the dura without wounding the branches of the middle meningeal which are deeply channelled in the bone in this region. The dura reached, it can easily be elevated and the finger carried down along the roof of the petrous. The attachment, thickening and condition of the dura will indicate in some measure the progress of the inflammation, while the presence of recent lymph will betoken the presence and proximity of cerebral abscess.

With the finger within the skull and resting upon the petrous, the chisel or drill may be made to puncture the mastoid, and the entire carious mass can be approached with the utmost confidence and precision. If cerebral abscess is present the roof of the petrous can readily be pierced and through this the abscess drained. Should pus have found its way into the posterior cerebral fossa, following the course of the internal auditory meatus, then the tentorium must be detached and an outlet established by free *direct* drainage; whether the chisel used as a drill, or drill will do best work through the mastoid or external auditory meatus must be decided by the operator.

There is a single accompaniment of fracture of the base of the skull from a fall upon the chin that I will refer to in this connection. A few instances have been recorded of death from cerebral abscess as the result of such injuries. In Holmes and Hulke is an account of the case of M. Chassaingnac whose patient lived five or six months with the right condyle driven into the cavity of the skull. The autopsy revealed the correctness of the diagnosis, and the cerebral abscess accounted for the pain and brain symptoms.

Now in all the references I have made the *history of the injury or disease is clear, the symptoms unmistakable, the prognosis death*, and yet not a finger raised to avert it. It may be urged that to trephine and insert the finger exploring the suspected area is a bold procedure. This is not true. There is no such thing as bold surgery at the present day. There is such a thing as reckless surgery, but even this cannot be condemned with greater severity or stricter justice than the *stolid* indifference with which the profession has for centuries witnessed the fatal issue in this class of cases.